

# Biochemistry and Molecular Biology 462

## Course Information and Lecture Schedule

Fall Semester 2009

9:10 - 10:00 A.M., M W F

158 Natural Resources

### Instructors

Dr. Jon Stoltzfus (Course Coordinator)

Dr. Laurie S. Kaguni

### Course Objectives

BMB462 is the second semester of the undergraduate series, BMB461-2. This course is an introduction to biochemistry at the advanced undergraduate level. BMB462 continues the study of metabolism begun in BMB461 and then examines the transmission and expression of the genetic material in bacterial and eukaryotic cells. The following topics will be discussed during this term:

- lipids and membranes
- lipid metabolism
- amino acid metabolism
- energy metabolism summary
- structure and metabolism of purine and pyrimidine nucleotides
- structure, properties, replication and repair of DNA
- DNA cloning technology
- structure, properties, biosynthesis and processing of RNA
- biosynthesis and targeting of proteins
- regulation of gene expression

### Course Structure

This three-credit course meets Monday, Wednesday and Friday from 9:10 to 10:00 A.M. each week in room 158 Natural Resources. Attendance at lectures is **expected**. Reading assignments are provided to familiarize you with vocabulary and concepts **prior to lecture** and to reinforce and further develop subjects following lecture. You may expect some exam questions to be formulated directly from the textual reading. A course pack is provided to aid in taking notes during lecture and while reading, it is not a substitute for the textbook. i-clickers are used to facilitate active learning during lectures. Homework problems are provided thorough LON-CAPA to help you master material and assess your progress. Exams based on a combination of information from lecture, the text, and the LON-CAPA problems are the major assessment in the course.

### Textbook

Nelson, D.L. and Cox, M.M. *Lehninger Principles of Biochemistry*, 5<sup>th</sup> ed. (2008). W.H. Freeman, New York. 1158 pages

### Course Pack

A course pack is available at the Spartan Bookstore in the International Center. This contains black & white copies of most figures that will be used during lectures and space for notes. The course pack is also available on Angel for those who wish to print a color version rather than purchasing a black & white copy. The course pack is based on the textbook, so most of the figures and information it contains can also be found in Lehninger. The course pack is not a substitute for the textbook or regular lecture attendance. It is recommended that you bring the course pack to lectures as it contains most figures discussed during lecture and is intended to aid in note taking during lectures and while you read the text.

## Clickers

This course will use i-clickers to facilitate active learning. Clickers may be registered at the beginning of lecture any time during the first two weeks of the semester. If you do not register your clicker during this time you may not receive credit for previous clicker questions. During each lecture you will have one or more opportunities to answer questions using the clicker. You will receive 9/10<sup>th</sup> of a point for sending in any answer and an additional 1/10<sup>th</sup> of a point for sending in the correct answer. Some questions are designed to generate discussion and may not have a correct answer. In this case, you will receive one point for any answer. If you receive 90% of the possible clicker points from material for a particular exam, you will receive full credit for the clicker portion of your grade. Clicker points covering material from each exam will be worth 0.5% of your final grade making the Clicker points worth 2% of your final grade. It is your responsibility to understand the feedback lights on your clicker and verify that your answers are received. If your clicker malfunctions during class, please notify the TA immediately. It is your responsibility to bring your clicker to class each day and if you forget to bring your clicker or miss class for any reason, you will receive no points for that day. Because you only need 90% to get full credit, you can miss class for the occasional emergency without seriously impacting your clicker scores.

## Office Hours

Questions concerning subjects covered in the lectures, assigned reading, or homework may be discussed with the individuals listed below at the times and places shown. Note that office hours are not intended to substitute for attendance at lectures. Prior to attending scheduled office hours please review the lecture recording (see Recordings above) and bring your written notes and questions with you.

Instructor Information	Lectures	Office and Office Hours
Dr. Jon Stoltzfus Phone: 432-8775 e-mail: stoltzfu@msu.edu	Lectures 1-21 and 31-39	305 Biochemistry Bldg. M 1:30 – 2:30 P.M. Tu 3:30 – 4:30 P.M. Th 10:15 – 11:15 A.M. By appointment
Dr. Laurie S. Kaguni Phone: 353-6703 e-mail: lskaguni@msu.edu	Lectures 22-30	319A Biochemistry Bldg. Tu 11:00 A.M – 12:00 P.M. Th 1:00 – 2:30 P.M.
Xiao Pan e-mail: panxiao@msu.edu		85 Chemistry Bldg. Tu & Th 5:30-6:30 P.M.

## Electronic Resources

ANGEL will be used to post lecture notes, lecture recordings, grades, and other general course information. It will also be used for e-mail and a general discussion board. Be sure you have ANGEL setup so you receive e-mail sent from this source. LON-CAPA will be used for online assignments and for discussions pertaining directly to those assignments.

## Recordings

This semester we are providing audio-video recordings of the lectures. The purpose of these recordings is to allow review of lectures as you study. **These recordings are not a substitute for attending lectures.** You should not depend on these recordings: some lectures may not be available or may be of poor quality due to technical difficulties. The audio-video recordings will be posted on ANGEL the afternoon after each lecture.

## LON-CAPA Homework

Homework for BMB 462 is available through LON-CAPA (<http://loncapa.msu.edu/>). Log on using your MSU Net ID and password. This homework covers **some** of the concepts you need to know but is not exhaustive. It should give you a feel for the types of things you are expected to know on the exam. It is also recommended that you work the problems available at the end of each chapter in the text. The LON-CAPA problems covering material from each exam will be worth 2% of your final grade making the homework worth 8% of your final grade.

You are authorized and encouraged to work together and help each other learn how to solve the homework problems but you must log on and solve your own homework problems to receive credit. Postings on the discussion board that describe the thought process or techniques you used to solve a problem or other information that will help classmates learn to solve problems are authorized and encouraged. Simply posting answers is not allowed, is a breach of academic integrity, and will be treated as such. Please read Discussion Board Etiquette in the Lessons Tab of ANGEL for more information.

## Missed Assignments and Technical Issues with LON-CAPA

On occasion, technical issues related to the online homework may occur. Dr. Stoltzfus will attempt to assist you in resolving such issues. However, as long as access to LON-CAPA through the computer labs on Michigan State University's campus is available, technical difficulties with your computer or your internet service providers are not excuses for missing the homework. Unless there are technical problems with LON-CAPA or the MSU computer labs there will be no homework extensions. You are encouraged to record the LON-CAPA receipt number when you complete each assignment as a record that you have completed that assignment.

## Examinations

All exams will be in room 158 Natural Resources. You will receive instructions concerning the exam and must follow these instructions when you enter the room on the day of the exam. The examinations are multiple choice and should be finished in 50 minutes. All exams are cumulative because concepts on each exam rely heavily on concepts previously covered in the course. Exams I-III will commence at 9:10 A.M. and will terminate at 10:00 A.M. Exam IV will commence at 8:15 A.M. and will terminate at 9:30 A.M.

Academic honesty is expected. As discussed in the Spartan Life Student Handbook General Student Regulation Part 1, PROTECTION OF SCHOLARSHIP AND GRADES:

“The principles of truth and honesty are fundamental to the educational process and the academic integrity of the University; therefore, no student shall:

- 1.01 claim or submit the academic work of another as one's own.
- 1.02 procure, provide, accept or use any materials containing questions or answers to any examination or assignment without proper authorization.
- 1.03 complete or attempt to complete any assignment or examination for another individual without proper authorization.
- 1.04 allow any examination or assignment to be completed for oneself, in part or in total, by another without proper authorization.”

Exams are an individual effort and you should neither give nor receive help during an examination. Policies to ensure academic integrity will be strictly enforced. Any instance of academic dishonesty will result in a failing grade for the exam and may result in a failing grade for the course.

## Excused Absences

With the exception of technical problems originating in LON-CAPA or the MSU network, there are no extensions on LON-CAPA homework. Only illness or a death in the student's immediate family will be considered a legitimate excuse for absence from an exam. In order to be considered for a make-up exam, it is the student's responsibility to contact the instructor **within 24 hours** of the missed exam and to provide adequate written documentation of the illness or death within 72 hours of the original exam. Make-up exams are administered at the instructor's convenience, typically **within 72 hours of the original exam**. Make-up exams may consist of essay questions or multiple choice questions at the instructor's discretion.

## Grades

Your grade in BMB 462 will be determined by your performance on the following assessments:

Assessment	%	Date
Exam I	22.5%	September 28
Exam II	22.5%	October 26
Exam III	22.5%	November 23
Exam IV	22.5%	December 18
LON-CAPA Homework	8%	See the "LON-CAPA Homework" Section for Details
i-clickers	2%	See the "Clickers Section" for Details

Your grade in the course will be based on your overall percentage or on your percentile (as calculated from the overall distribution of undergraduate scores using the percentrank function in Excel). Whichever scale gives you the higher grade will be used to assign final grades. Grades for graduate students will be determined from the undergraduate distribution.

Grade	Overall %	Percentile
4.0	≥ 92.00	≥90.00
3.5	≥ 84.00	≥75.00
3.0	≥ 78.00	≥55.00
2.5	≥ 70.00	≥35.00
2.0	≥ 62.00	≥20.00
1.5	≥ 56.00	≥10.00
1.0	≥ 50.00	≥ 5.00
0.0	< 50.00	< 5.00

## Honors Option

Students who desire may elect to take BMB462 with the H-option provided they are progressing at the 3.0 level or higher. If you are considering an H-option you must send Dr. Stoltzfus an e-mail **before September 15** making your intentions known. You must meet with Dr. Stoltzfus at 8:00 A.M. on Friday, September 18 in 158 N.R. to discuss scientific literature and research procedures in the context of the honors assignment. Attendance at this meeting is required. The honors option consists of a term paper on some aspect of biochemistry related to material presented in BMB462. The topic should relate to a process described in BMB462. You will receive more information at the honors option meeting.

## BIOCHEMISTRY AND MOLECULAR BIOLOGY 462 LECTURE SCHEDULE FALL 2009

Date	Lect. No.	Topic	Assigned Reading Pages
9/2	1	Lipid structures and properties	Pages 343-367; 817-820; 844-845
9/4	2	Lipid structures and properties	Pages 357-367; 817-820; 844-845
9/7	<b>NO CLASS - Labor Day</b>		
9/9	3	Membrane structure and properties	Pages 371-389
9/11	4	Membrane structure and properties	Pages 371-389
9/14	5	Membrane transport	Pages 389-413
9/16	6	Signaling	Pages 419-457
9/18	7	Signaling	Pages 419-457
9/21	8	Lipid Catabolism	Pages 647-668
9/23	9	Lipid Catabolism	Pages 647-668
9/25	10	Fatty Acid Anabolism	Pages 805-817
9/28	<b>EXAM ONE – Lectures 1 through 9</b>		
9/30	11	Glycerolipid and Sphingolipid Anabolism	Pages 820-831
10/2	12	Cholesterol Anabolism	Pages 831-845
10/5	13	Amino Acid Metabolism	Pages 673-693; 696-698
10/7	14	Amino Acid Metabolism	Pages 851-863; 873-882
10/9	15	Metabolic Integration	Pages 901-930
10/12	16	Metabolic Integration	Pages 901-930
10/14	17	Nucleotide Chemistry	Pages 945-946; 271-277; 296-298
10/16	18	Nucleotide Metabolism	Pages 882-896
10/19	19	Gene Transmission and DNA Structure	Pages 27-36; 945-946; 277-292
10/21	20	DNA Structure	Pages 277-292
10/23	21	Chromosome Structure	Pages 947-971
10/26	<b>EXAM TWO – Lectures 10 through 20</b>		
10/28	22	DNA Replication	Pages 975-992
10/30	23	DNA Replication	Pages 975-992
11/2	24	DNA Replication	Pages 975-992; 1050-1055
11/4	25	DNA Repair & Recombination	Pages 289-292; 993-1016
11/6	26	DNA Repair & Recombination	Pages 993-1016
11/9	27	DNA Cloning	Pages 303-324; 292-294
11/11	28	RNA Structure & Function; Transcription	Pages 283-286; 31-32; 945-946
11/13	29	Transcription	Pages 1021-1033
11/16	30	Transcription	Pages 1021-1033
11/18	31	RNA Processing	Pages 1033-1050
11/20	32	RNA Processing	Pages 1033-1050; 1056-1059
11/23	<b>EXAM THREE – Lectures 21 through 30</b>		
11/25	33	Translation	Pages 1065-1074
11/27	<b>NO CLASS - Thanksgiving</b>		
11/30	34	Translation	Pages 1075-1087
12/2	35	Translation	Pages 1088-1100
12/4	36	Protein Processing, Targeting and Degradation	Pages 1100-1109
12/7	37	Regulation of Gene Expression	Pages 1115-1125
12/9	38	Regulation of Gene Expression	Pages 1126-1136
12/11	39	Regulation of Gene Expression	Pages 1136-1154
12/18	<b>FINAL EXAM – Lectures 31 through 39 from 8:15 A.M. to 9:30 A.M.</b>		

Note that exam dates are fixed but the dates that material is presented and the exact material on exams may vary due to the pace of the course.